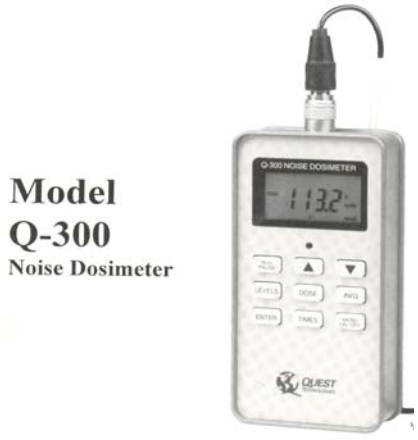
Contents



1.0 Purpose/Scope

This procedure provides a standardized method for the operation of the Quest Q-300 Personnel Noise Dosimeter. It should be used in conjunction with the SBMS Subject Area Noise and Hearing Conservation and IH SOP IH96300: *Noise Measurement Principles: Noise Dosimetry.*

Employee exposure assessments for regulatory compliance should be made with a noise dosimeter, such as the Q-300. Employees wear dosimeters as they move through the work area. The dosimeter logs a close representation to the actual noise exposure of the ear as the distance from the source changes with employee movements. The logged exposure data is compared to occupational exposure limits to determine compliance with hearing conservation regulations. The logged data provided by the Q-300 includes both OSHA and ACGIH records by pre-determined settings.

The Quest Q-300 Noise Logging Dosimeter is a microcomputer-based sound analyzing instrument for accumulating, displaying, and sending data to serial or parallel printers or computers. The Q-300 can function as a personal noise dosimeter, an area monitor or a survey event monitor. While the Q-300 can be used as a survey meter, other SPL meters designed as precision area survey meters offer more features (such as impact/ impulse capturing) and should be used for area surveys.

2.0 Responsibilities

2.1 Use of the Q-300 shall be limited to persons who act under the direction of a competent hazard assessment person and have demonstrated the competency to satisfactorily use the meter, as evidenced by experience and training, to qualification criteria set by BNL. See Section 7.

2.2 Personnel that perform exposure monitoring with this instrument are responsible to follow all steps in this procedure.

2.3 The data collected using this meter must have an appropriate evaluation of the hazard and risk by a knowledgeable Industrial Hygiene professional.

3.0 Definitions

CL: Criterion Level; The constant sound level in dB that, if applied for 8 hours, would accumulate a DOSE of 100%. (Used in Dose measurements.)

dB: Decibel: A non-dimensional unit used to express sound pressure levels. It is the log of the ratio of the measured sound pressure level to a reference level.

dBA: A sound pressure level in decibels made on the A-scale of a sound level meter. This unit of measure approximates the response of the human ear.

dBC: Sound pressure based on a nearly flat, non-weighted scale.

DOSE: A percentage of the maximum allowable noise that a worker can be exposed to per day. This is a computation that is based on the following variables: Criterion Level (CL), Lower Threshold (LT), and Exchange Rate (ER).

ER: Exchange Rate; The number of decibels that a sound must change to either halve or double the rate of dose accumulation. (3, 4, 5 or 6 dB exchange rates are common.)

LAVG: The average sound level, in decibels, for the measurement period based on a 4, 5, or 6 dB Exchange Rate (ER). If the ER is 3 dB, then LAVG becomes LEQ.

LEQ: Equivalent Continuous Sound Level; The average sound level for the measurement period based on a 3 dB ER. If the ER is 4, 5, or 6 dB, then LEQ becomes LAVG.

Occupational Exposure Limit: The maximum time weighted average (TWA) exposure permitted for employee exposure, based on the lesser of the OSHA Permissible Exposure Limit

(PEL) or ACGIH Threshold Limit Value (TLV). See IH96300.

SEL: Sound Exposure Level; The constant sound level in decibels which, if lasting for one second, would deliver the same amount of acoustical energy as that delivered over the entire measurement period.

TL: Threshold Level; A preset level in decibels below which sound is not accumulated or averaged into LAVG, LEQ or DOSE.

4.0 Prerequisites

4.1 Area Access:

4.2.1 Contact the appropriate Facility Support Representative or Technician to obtain approval to enter radiological areas, if applicable. Verify with the appropriate Facility Support Representative or Technician if a Work Permit or Radiological Permit is needed or is in effect. If so, review and sign the permit.

4.2.2 Use appropriate PPE for area, including hear protection if the area has not been characterized for noise exposure. Required training and medical approval must be completed prior to wearing PPE.

5.0 Precautions

5.1 **Hazard Determination:**

5.1.1 The operation of this dosimeter does not cause exposure to any chemical, physical, or radiological hazards. The meter design does not cause significant ergonomic concerns in routine use.

5.1.2 The dosimeters do not generate Hazardous Waste.

5.1.3 By its very nature, noise dosimeters may be used in areas where excessive noise levels exist or are suspected to be present. Exposures to noise levels above the PEL and/or TLV may cause temporary or permanent hearing loss.

5.2 **Personal Protective Equipment:**

5.2.1 In areas where noise levels exceed the *Occupational Exposure Limit (OEL)*, hearing protection must be worn. The hearing protection should be able to reduce the noise levels below the OEL. See IH96300 for guidance on PPE

selection.

5.2.2 Additional PPE: Other appropriate PPE for the area being entered. Check with your FS representative.

5.3 **Dosimeter Calibration:** Failure to calibrate the Quest Q-300 prior to and post use may result in an increased margin of error in the results. All field testers must verify a valid calibration status in accordance with Section 6.0.

6.0 Procedure

Windscreen on the Microphone

6.1 **Equipment:** (Pictured in Appendix 9.1)
- 6.1.1 Meter Body
- 6.1.2 Microphone and windscreen (foam cylinder)
- 6.1.3 Calibrator (Model QC-10/QC-20)

6.2 **Start and warming up the Q-300** (picture of meter and description of controls and displays is contained in Appendix 9.1.)
- 6.2.1 **Turning the meter on:** Press ***Menu/On/Off***
- 6.2.2 **LOBAT:** If the LOBAT light comes on, replace the batteries.
- 6.2.3 **Warm-up:** A warm-up is not required for this meter.

6.3 **Clearing Data from the Memory:** To calibrate and store the calibration data, the instrument must be cleared of data. To clear the memory, the instrument must be in ***Pause*** mode.
- 6.3.1 Press ***Run/Pause*** so Pause shows in the display.
- 6.3.2 Press ***Menu/On/Off*** key until "res5" is displayed.
- 6.3.3 Press and hold the ***Enter*** key for five seconds as the display counts down from "res5" to "res1".

6.4 **Calibration of the Q-300** (picture of meter and description of controls and displays is contained in Appendix 9.1.)
- 6.4.1 **Calibration:** Slide the calibrator *Power Switch* to ***On***. Check the battery indicator and replace batteries if necessary. Listen to hear if Calibrator is producing a tone.
- 6.4.2 Remove the windscreen from the microphone. Insert the dosimeter microphone into the calibrator adaptor.
- 6.4.3 Press ***Levels*** and use the arrow keys to set the Q-300 to

Microphone inserted into calibrator

read SPL.

6.4.4 Observe the meter reading in dB. The reading should be the proper level = **114.0** +/- 0.5 dB.

6.4.5 Press the ***Menu/On/Off*** key then the up arrow.

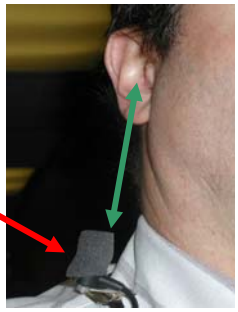
6.4.6 The CAL annunciator in the display will light, and the number in the display should match the output level of the calibrator. Press ***Run/Pause*** to begin the calibration routine. The display will read "CAL" and after a few seconds return to the previous CAL display.

6.4.7 When the CAL data is stored it will be included in the printout of each study. Also record the reading on the ***BNL Noise Dosimeter Form.***

6.4.8 If the reading is not within calibration return the dosimeter to the IH lab and do not use.

6.4.9 Remove the microphone from the calibrator, turn off the calibrator and press ***Menu/On/Off*** to return to the ON screen. The meter is now ready to be used for monitoring.

6.5 Meter Operation:



6.5.1 Install the windscreen (foam cylinder) over the microphone.

6.5.2 Attach the microphone to the workers collar near the ear. Clip the meter to belt or place in a coat, suit, or pant's pocket. IMPORTANT NOTE: Unit should be on ***Pause*** to prevent the movement and handling of the microphone from being stored as noise exposure.

6.5.3 If *LOBAT* is displayed, replace the battery and continue.

6.5.4 When work is ready to begin, press ***RUN/PAUSE*** to begin logging noise exposure. RUN will be displayed.

6.5.5 You can separate the logging into "events" (such as before and after breaks for lunch) by pressing the ***RUN/PAUSE*** key. This will pause the instrument for events such as leaving for lunch. Press ***RUN/PAUSE*** again to begin a new event upon return to work. If taking the instrument off the worker, pause the monitor before removing it and start the monitor after repositioning the instrument on the worker. All events will be averaged together at the end to calculate a daily average and dose.

6.5.6 When monitoring is completed, press ***RUN/PAUSE*** to place the unit in pause mode. Turn off the unit by holding the ***Menu/On/Off*** key for five seconds. Data will be saved in the unit.

6.5.7 Return the instrument to the IH lab. Post-calibrate the meter as per step 6.4. Record Cal data on ***BNL Noise Dosimeter Form.***.

6.5.8 Record all data on the ***BNL Noise Dosimeter Form.*** (Attachment 9.4). It is important to record what the worker was doing throughout the day with enough detail to correlate with the logged data.

6.6 **Printing of Logged Data:**

6.6.1 Print data directly from the instrument using the IH lab computer.

6.6.2 Connect the dosimeter directly to the serial printer via the multi-pin cable.

6.6.3 The printout will include a summary table for Dosimeters I, II & III. Dosimeter I readings are set for OSHA compliance and dosimeter II is set for ACGIH compliance. Data is not lost during printout.

6.6.4 **Printing a hardcopy report:** While in pause mode, press the ***Menu/On/Off*** key and RES5 will be displayed. Press the ***down arrow*** key to display Prn7.

6.6.5 Press the ***Run/Pause*** key and PrLL will appear in the display and the print will begin.

6.6.6 When print is finished, review the printout to ensure accurate representation of the data.

6.6.7 Turn the unit off, remove the computer cable, replace the microphone on the unit and check the dosimeter back into the IH equipment database.

6.7 **Documenting Sampling Data and Work Conditions readings:**

6.7.1 Use the ***BNL Noise Dosimeter Form*** to record field events and information (Attachment (9.4).

6.7.2 Complete the ***Employee Notification Form*** (Attachment 9.4 of IH96200) and send a copy to the worker, the supervisor and the IH lab.

6.7.3 Enter data into the IH Noise Database.

6.7.4 Provide a copy of the printed data, the original *BNL Noise Dosimeter Form,* and the *Employee Notification Form* to the SHSD IH Laboratory Technician.

6.8 **Results interpretation**:

6.8.1 A competent person should write a hazard evaluation report that evaluates the survey data and summarizes the potential for occupational exposure and compliance with OSHA and ACGIH Occupational Exposure Limits.

6.8.2 Ensure that a copy of the hazard evaluation report is sent to the IH Laboratory and is included in the ESHQ Directorate Recordkeeping system.

6.8.3 Ensure that a copy of the written hazard evaluation report is sent to the Occupational Medicine Clinic with the worker's BNL Life Number noted.

Note: The hazard evaluation report and/or an *Employee Notification Form* (Attachment 9.4 of IH96200) must be used to inform all monitored employees of the results of the monitoring and the implication to compliance with OELs. Reporting to employees should be within 15 days of monitoring.

7.0 Implementation and Training

7.1 Training prior to using this meter includes a demonstration of proper operation of the instrument based on training, education, and experience. All persons must have met the qualification criteria for IH96 Noise Assessor set in *IH50300 BNL IH Program and IH Group Training & Qualification Matrix.*

7.2 Personnel are to document their training using Attachment 9.5, the Job Performance Measure Completion Certificate. Qualification on this JPM is required on a 3 year basis, providing the professional is monitoring noise sources frequently.

7.3 A baseline audiogram may be needed if the duration of exposure to the person performing the survey will be in excess of the OSHA Permissible Exposure Limits (PEL) or ACGIH Threshold Limit Value (TLV) (which ever is less). See IH96200.

7.4 Other appropriate training for the area to be entered (check with ESH coordinator or FS Representative for the facility).

8.0 References

8.1 Quest Q-300 Instruction Manual 59-253 12/86.
8.2 BNL SBMS Subject Area Noise and Hearing Conservation
8.3 OSHA Noise/Hearing Conservation 29CFR1910.95.
8.4 NIOSH Criteria for a Recommended Standard-Occupational Noise Exposure, 1998.
8.5 ACGIH American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

9.0 Attachments

10.0 Documentation

Document Development and Revision Control Tracking		
PREPARED BY: *(Signature and date on file)* **J. W. Peters** **Date: 11/14/2003**	**REVIEWED BY:** *(Signature and date on file)* **R. Selvey** **Date: 3-24-04**	**APPROVED BY:** *(Signature and date on file)* **R. Selvey IH Manager** **Date: 3/24/04**
ESH Coordinator/ Date: *none*	Work Coordinator/ Date: *none*	SHSD Manager / Date *none*
QA Representative / Date: *none*	Training Coordinator / Date: *none*	Filing Code: **IH52**
Facility Support Rep. / Date: *none*	Environ. Compliance Rep. / Date: *none*	Effective Date: **03/25/04**
ISM Review - Hazard Categorization ☐ High ☒ Moderate ☐ Low/Skill of the craft	Validation: ☐ Formal Walkthrough ☐ Desk Top Review ☐ SME Review Name / Date:	Implementation: Training Completed: Tracked in BTMS Procedure posted on Web: 11/02/05 Hard Copy files updated: 11/02/05

Revision Log		
Purpose: ☐ Temporary Change ☐ Change in Scope ☐ Periodic review ☐ Clarify/enhance procedural controls Changed resulting from: ☐ Environmental impacts ☐ Federal, State and/or Local requirements ☐ Corrective/preventive actions to non-conformances ☒ none of the above Section/page and Description of change: Added Attachment 9.6. Revised Section 7 on qualification.		
(signature on file) Robert Selvey 07/12/04 SME Reviewer/Date:	Reviewer/Date:	Reviewer/Date:
Purpose: ☐ Temporary Change ☐ Change in Scope ☐ Periodic review ☒ Clarify/enhance procedural controls Changed resulting from: ☐ Environmental impacts ☐ Federal, State and/or Local requirements ☐ Corrective/preventive actions to non-conformances ☒ none of the above Section/page and Description of change: Revised Section 7 training requirements. Updated Section 10 to new format. Eliminated Attachment 9.5 Notification Form, as it exists in IH96200.		

BROOKHAVEN NATIONAL LABORATORY Safety & Health Services Division **INDUSTRIAL HYGIENE GROUP** Standard Operating Procedure: Field Procedure	NUMBER **IH96650**
	REVISION **FINAL rev2**
SUBJECT: INSTRUMENT OPERATION: **Quest Q-300 Noise Dosimeter**	DATE **11/02/05**
	PAGE **9** OF 17

(signature/date on file) R. Selvey 11/02/05 SME Reviewer/Date:	SME Reviewer/Date:	SME Reviewer/Date:

BROOKHAVEN NATIONAL LABORATORY Safety & Health Services Division INDUSTRIAL HYGIENE GROUP Standard Operating Procedure: Field Procedure	NUMBER **IH96650**
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SUBJECT: INSTRUMENT OPERATION: **Quest Q-300 Noise Dosimeter**	DATE **11/02/05**
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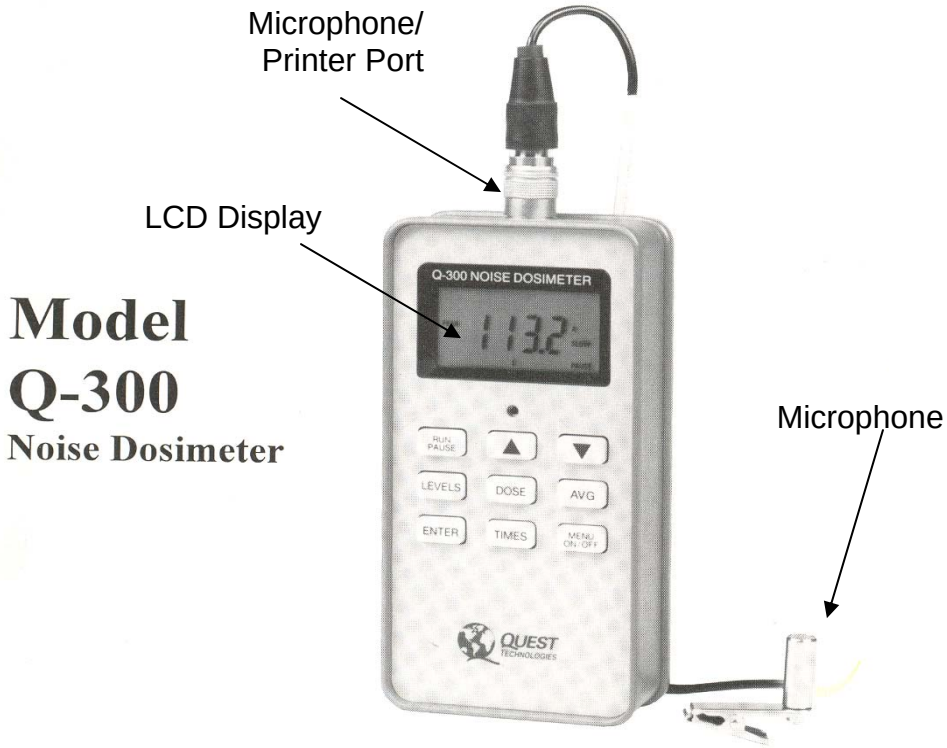
Attachment 9.1

Photo of the Meter and Parts



Model QC-10 Calibrator

Attachment 9.2

Control Keys

Control Keys	
LEVELS	The LEVELS function key shows the current SLM readings. Move through the items (SPL, MAX, MIN or PEAK) using the arrow keys. Pressing LEVELS again selects the next dosimeter (I, II, or III) and displays the levels for that dosimeter.
MENU/ON/OFF	Pressing this key turns the meter on. After a warm up period of several seconds, the display will read “on” and the dosimeter is ready to use. Pressing and holding this key five seconds will cause the display to read “off”5” and count down for five seconds until “off” is displayed. After this the display will blank and you may release the key. Releasing the key will turn the unit off. Briefly pressing and releasing this key will toggle the display between ‘on’ and ‘res5” (reset), when in the Pause mode.
ENTER	The ENTER key is used in the setup menu to begin and end a change of a menu item’s value or state. After using the arrow keys to select a menu item, press ENTER to light the SET indicator, allowing the value to be changed with the arrow keys. After changing, press ENTER to store the value.
UP ARROW	Press to move upward through the menu
DOWN ARROW	Press to move downward through the menu
RUN/PAUSE	Press to toggle between Run Mode and Pause Mode. If the Q-300 is in the setup menu at either Cal or Prn, pressing this key will begin a calibration or start printing, respectively.
DOSE	The DOSE function key selects the group of items DOSE, PDOSE or EXP for display. Pressing the DOSE key again selects the next dosimeters (I, II, or III) dose group to be displayed.
AVERAGE	The AVG function key selects the group of items LAVG, TWA or SEL for display. Pressing the AVG key again selects the next dosimeters (I, II, or III) averages to be displayed.
TIME	The TIMES function key selects the group of items RT, PT, or UL (Run Time, Pause Time or Upper Limit Time) for display. Pressing TIMES again selects the next dosimeters (I, II, or III) times to be displayed.

Attachment 9.3
Short Operating Instructions

Step		User Action
1	**Power On**	Press ***Menu/On/Off***
2	**Battery Check**	Observe screen for warning ***LoBAT.***
3	**Warm-Up**	A warm-up is not required for this meter.
4	**Pre- Calibration**	To calibrate and store the calibration data. Clear data. • Press ***RUN/PAUSE*** so Pause shows in the display.
		• Press ***Menu/On/Off*** key until "res5" is displayed. Press and hold the ***Enter*** key for five seconds as the display counts down from "res5" to "res1".
		• Slide the calibrator *Power Switch* to On. • Remove the windscreen from the microphone. Insert the dosimeter microphone into the calibrator adaptor. • Press ***Levels*** and use the arrow keys to set the Q-300 to read SPL. The reading should be the proper level (114.0 dB) within 0.5 dB.
		• Press the ***Menu/On/Off*** key then the up arrow. The CAL annunciator in the display will light, and the number in the display should match the output level of the calibrator. • Press ***Run/Pause*** to begin the calibration routine. The display will read "CAL" and after a few seconds return to the previous CAL display.
		Remove the microphone from the calibrator, turn off the calibrator and press ***Menu/On/Off*** to return to the ON screen.
		Press and hold ***Menu/On/Off and turn unit Off.*** The meter is now ready to be used for monitoring.
5	**Dosimeter Set-up**	Attach the microphone to the workers collar near the ear. Clip meter to belt. (Note: Unit should be OFF).
6	**Operation**	Press ***Menu/On/Off*** to turn unit on. To accumulate event Data: press ***RUN/PAUSE*** so that Run shows in the display.
		If you need to pause the event: press ***RUN/PAUSE*** so Pause shows in the display then again to start another run. During a run the display may show LO, which means the ambient noise level is below the threshold setting. This is normal for quiet areas.
7	**Stop Logging**	Press ***RUN/PAUSE*** to pause.
8	**Power Off**	Turn off the unit by holding the ***Menu/On/Off*** key for five seconds. Data will be saved in the unit.

IH 96650 Attachment 9.4
Noise Dosimeter Data Form Q-300

(see next two page,
form is a two sided copy)

BROOKHAVEN NATIONAL LABORATORY Environmental, Safety, Health and Quality Directorate - Industrial Hygiene	EMPLOYEE NOISE DOSIMETER NOISE MEASUREMENT FORM
DATE:	SURVEYOR(S):

I. AREA INFORMATION		
DEPT:	BLDG:	ROOM:
NOISE SOURCE:		
ENGINEERING CONTROLS:		

II. EMPLOYEE INFORMATION		
FIRST NAME:	LAST NAME:	BNL #:
DEPT:	BLDG:	JOB TITLE:
EXPOSURE DURATION (HRS):	EXPOSURE (TIMES PER DAY):	EXPOSURE (DAYS PER YR):
JOB PERFORMED:		
PPE USED:		

III. SURVEY INSTRUMENT PREPARATION INFORMATION		
INSTRUMENT: **QUEST ELECTRONICS**	MODEL: **Q-300 LOGGING DOSIMETER**	SERIAL#:
CALIBRATOR SERIAL #:	PRE-CAL: BY:	POST CAL: BY:
BATTERY CHECK (Y/N):		

IV. SAMPLING INFORMATION & RESULTS ____Record Below or _____See Printed Data Log Report

TOTAL TIME (hh.mm)	DOSIMETER I			DOSIMETER II			DOSIMETER III		
OVER-EXPOSURE Y / N	% Dose	LAVG	LMAX	% Dose	LAVG	LMAX	% Dose	LAVG	LMAX

V. WORKER ACTIVITY INFORMATION		
TIME		COMMENTS- DETAILS ON THE ACTIVITY
ON	OFF	

Optional sketch of the Area

Additional Comments on the Job, Task, Hazard, etc.

V. CONCLUSIONS & RECOMMENDATIONS

IH 96650

Attachment 9.5

Noise Dosimeter Q-300 Qualification Form

(see next page)

BROOKHAVEN NATIONAL LABORATORY

IH96650 Attachment 9.5
HP-IHP-96650

Industrial Hygiene Program

Noise Dosimetry with the Quest Q-300
Job Performance Measure (JPM) Completion Certificate

Candidate's Name	Life Number:

Practical Skill Evaluation: Demonstration of Evaluation Methodology by Oral Exam

Criteria	Qualifying Performance Standard	Unsat.	Recov.	Satisf.
1. Hazard Analysis	Understands the need to perform a hazard analysis of the area and potential exposure to the self as sampler and workers in the area.			
2. Personal Protective Equipment	Understands the need to be aware of the potential surface contamination, airborne levels of contaminants, radiological hazards, and noise hazards. Knows how to determine the need for PPE.			
3. Sampling Equipment	Knows where equipment needed for the procedure is located and how to properly sign it out.			
6. Operating Parameters	Knows the theory to establish operating parameters (safety envelope) for the equipment.			
7. Documentation	Demonstrates correctly filling out IH monitoring forms.			

IH Noise Meter Operation - Practical Skill Evaluation: Demonstration of Methodology

Criteria	Qualifying Performance Standard	Unsat.	Recov.	Satisf.
1. Turning the Meter On and Off	Demonstrates correctly activating the meter and turning it off			
2. Calibration of the Meter	Demonstrates correctly calibrating/bump checking the meter			
3. Clearing Stored data	Demonstrates the correctly to erase stored data			
4. Operation of taking a reading	Demonstrates correctly attach the meter to worker			
5. Downloading stored data	Demonstrates correctly extracting stored data from the meter to paper printout and electronic storage.			
6. Clearing data after downloading	Demonstrates correctly for removing stored data for the next user.			

I accept the responsibility for performing this task as demonstrated within this JPM and the corresponding SOP.

Candidate Signature:	Date:

I certify the candidate has satisfactorily performed each of the above listed steps and is capable of performing the task unsupervised.

Evaluator Signature:	Date: